

What Is Claimed Is:

1 1. A method for aligning a first signal to optimize correlation with a
2 second signal, the method comprising:
3 receiving a set of signals including the first signal and the second signal;
4 determining a correlation between the first signal and the second signal;
5 performing an alignment adjustment to the second signal to adjust a
6 relative alignment between the first signal and the second signal;
7 determining a correlation between the first signal and the second signal
8 with the alignment adjustment;
9 determining if the correlation is greater with the alignment adjustment; and
10 if the correlation is greater with the alignment adjustment, adjusting the
11 alignment of the second signal.

1 2. The method of claim 1, further comprising combining the first
2 signal and the second signal into a combined signal.

1 3. The method of claim 1, wherein the first signal comprises a
2 combination of signals that have been aligned to optimize correlation.

1 4. The method of claim 3, further comprising removing a signal from
2 the combination of signals that has the lowest correlation with other signals in the
3 combination of signals.

1 5. The method of claim 4, further comprising re-optimizing the
2 correlation of each signal in the combination of signals with other signals in the
3 combination of signals.

1 6. The method of claim 3, further comprising predicting an individual
2 signal in the combination of signals by using a correlation of the individual signal
3 with other signals in the combination of signals to predict the individual signal.

1 7. The method of claim 6, further comprising:
2 measuring the individual signal;
3 comparing the measured individual signal with the predicted individual
4 signal; and
5 determining that the individual signal is faulty if the measured individual
6 signal does not substantially match the predicted individual signal.

1 8. The method of claim 7, further comprising predicting failure of a
2 component within a computer system when a signal generated by the component
3 is determined to be faulty.

1 9. The method of claim 3, further comprising discarding a signal that
2 is completely correlated with another signal in the combination of signals.

1 10. The method of claim 1, wherein prior to determining a correlation
2 between the first and second signals, the method further comprises performing an
3 analytical re-sampling operation, which uses interpolation to add data points to the
4 first and/or second signal to ensure that each signal has the same number of data
5 points.

1 11. The method of claim 1,

2 wherein determining the correlation between the first signal and the
3 second signal involves correlating a window of data points from the first signal
4 with a window of data points from the second signal; and
5 wherein the process of adjusting the alignment involves sliding the
6 window along the second signal, until correlation is maximized with the window
7 for the first signal.

1 12. The method of claim 11, further comprising adjusting the size of
2 the fixed window and/or the sliding window.

1 13. A computer-readable storage medium storing instructions that
2 when executed by a computer cause the computer to perform a method for
3 aligning a first signal to optimize correlation with a second signal, the method
4 comprising:
5 receiving a set of signals including the first signal and the second signal;
6 determining a correlation between the first signal and the second signal;
7 performing an alignment adjustment to the second signal to adjust a
8 relative alignment between the first signal and the second signal;
9 determining a correlation between the first signal and the second signal
10 with the alignment adjustment;
11 determining if the correlation is greater with the alignment adjustment; and
12 if the correlation is greater with the alignment adjustment, adjusting the
13 alignment of the second signal.

1 14. The computer-readable storage medium of claim 14, wherein the
2 method further comprises combining the first signal and the second signal into a
3 combined signal.

1 15. The computer-readable storage medium of claim 14, wherein the
2 first signal comprises a combination of signals that have been aligned to optimize
3 correlation.

1 16. The computer-readable storage medium of claim 15, wherein the
2 method further comprises removing a signal from the combination of signals that
3 has the lowest correlation with other signals in the combination of signals.

1 17. The computer-readable storage medium of claim 16, wherein the
2 method further comprises re-optimizing the correlation of each signal in the
3 combination of signals with other signals in the combination of signals.

1 18. The computer-readable storage medium of claim 15, wherein the
2 method further comprises predicting an individual signal in the combination of
3 signals by using a correlation of the individual signal with other signals in the
4 combination of signals to predict the individual signal.

1 19. The computer-readable storage medium of claim 18, wherein the
2 method further comprises:
3 measuring the individual signal;
4 comparing the measured individual signal with the predicted individual
5 signal; and
6 determining that the individual signal is faulty if the measured individual
7 signal does not substantially match the predicted individual signal.

1 20. The computer-readable storage medium of claim 19, wherein the
2 method further comprises predicting failure of a component within a computer
3 system when a signal generated by the component is determined to be faulty.

1 21. The computer-readable storage medium of claim 15, wherein the
2 method further comprises discarding a signal that is completely correlated with
3 another signal in the combination of signals.

1 22. The computer-readable storage medium of claim 13, wherein prior
2 to determining a correlation between the first and second signals, the method
3 further comprises performing an analytical re-sampling operation, which uses
4 interpolation to add data points to the first and/or second signal to ensure that each
5 signal has the same number of data points.

1 23. The computer-readable storage medium of claim 13,
2 wherein determining the correlation between the first signal and the
3 second signal involves correlating a window of data points from the first signal
4 with a window of data points from the second signal; and
5 wherein the process of adjusting the alignment involves sliding the
6 window along the second signal, until correlation is maximized with the window
7 for the first signal.

1 24. The computer-readable storage medium of claim 23, wherein the
2 method further comprises adjusting the size of the fixed window and/or the
3 sliding window.

1 25. An apparatus for aligning a first signal to optimize correlation with
2 a second signal, comprising:
3 a receiving mechanism configured to receive a set of signals including the
4 first signal and the second signal;
5 a correlation mechanism configured to determine a correlation between the
6 first signal and the second signal;
7 an adjustment mechanism configured to perform an alignment adjustment
8 to the second signal to adjust a relative alignment between the first signal and the
9 second signal;
10 wherein the correlation mechanism is configured to determine a
11 correlation between the first signal and the second signal with the alignment
12 adjustment; and
13 a comparison mechanism configured to determine if the correlation is
14 greater with the alignment adjustment;
15 wherein the adjustment mechanism is configured to adjust the alignment
16 of the second signal if the correlation is greater with the alignment adjustment.

1 26. The apparatus of claim 25, further comprising a combination
2 mechanism configured to combine the first signal and the second signal into a
3 combined signal.

1 27. The apparatus of claim 25, wherein the first signal comprises a
2 combination of signals that have been aligned to optimize correlation.

1 28. The apparatus of claim 27, further comprising a removal
2 mechanism configured to remove a signal from the combination of signals that
3 has the lowest correlation with other signals in the combination of signals.

1 29. The apparatus of claim 28, further comprising a re-optimization
2 mechanism configured to re-optimizing the correlation of each signal in the
3 combination of signals with other signals in the combination of signals.

1 30. The apparatus of claim 27, further comprising a prediction
2 mechanism configured to predict an individual signal in the combination of
3 signals by using a correlation of the individual signal with other signals in the
4 combination of signals to predict the individual signal.

1 31. The apparatus of claim 30, further comprising:
2 a measuring mechanism configured to measure the individual signal;
3 a performance mechanism configured to compare the measured individual
4 signal with the predicted individual signal; and
5 a fault-determination mechanism configured to determine that the
6 individual signal is faulty if the measured individual signal does not substantially
7 match the predicted individual signal.

1 32. The apparatus of claim 31, further comprising a component-failure
2 mechanism configured to predict failure of a component within a computer system
3 when a signal generated by the component is determined to be faulty.

1 33. The apparatus of claim 27, further comprising a discarding
2 mechanism configured to discard a signal that is completely correlated with
3 another signal in the combination of signals.

1 34. The apparatus of claim 25, further comprising a re-sampling
2 mechanism configured to perform an analytical re-sampling operation, which uses
3 interpolation to add data points to the first and/or second signal to ensure that each
4 signal has the same number of data points.

1 35. The apparatus of claim 25,
2 wherein the correlation mechanism is configured to determine a
3 correlation between a window of data points from the first signal with a window
4 of data points from the second signal; and
5 wherein the adjustment mechanism is configured to slide the window
6 along the second signal, until correlation is maximized with the window for the
7 first signal.

1 36. The apparatus of claim 35, wherein the first and second adjustment
2 mechanisms are further configured to adjust the size of the fixed window and/or
3 the sliding window.